Claims

- 1 1. A method of making a fiber pitch binder comprising the steps of:
- 2 (a) providing a pitch having a viscosity of about 0.1 to about 5 poise;
- 3 (b) providing carbon fibers in an amount of about 0.5 to about 10.0 wt.% of said pitch; and
- 5 (c) admixing said fibers and said pitch to disperse said fibers into a fiber pitch 6 binder.
- The method of claim 1 wherein step (a) comprises providing a pitch having a viscosity of about 0.1 to about 5 poise at a temperature of about 260° to about 3 140°C.
- 1 3. The method of claim 1 wherein in step (c) said fibers are substantially 2 dispersed into substantially single mono-filaments which are randomly oriented within the fiber pitch binder.
- 1 4. The method of claim 1 wherein step (b) comprises providing carbon fibers in 2 an amount of about 5 wt.% of said pitch.
- 1 5. The method of claim 1 wherein step (b) comprises providing an amount of carbon fibers having a length of about 6 to about 30 mm.
- 1 6. The method of claim 5 wherein step (b) comprises providing an amount of 2 carbon fibers containing sizing.
- 1 7. The method of claim 1 wherein in step (b) said fibers are added to said pitch
- 2 without a substantial amount of a filler.
- 1 8. The method of claim 1 wherein step (a) comprises providing an amount of
- 2 pitch derived from coal tar.

- 1 9. The method of claim 1 wherein step (a) comprises providing an amount of 2 pitch derived from petroleum feedstock.
- 10. The method of claim 1 wherein step (c) comprises admixing said fibers and 1
- 2 said pitch by heating said fibers and said pitch to a temperature wherein said pitch
- 3 has a viscosity\of less than about 5 poise, followed by stirring at about 100 to about
- 4 1000 rpm for a\sufficient time such that said fibers are substantially dispersed into
- 5 substantially single mono-filaments which are randomly oriented within the fiber
- pitch binder.
 - The method of claim 1 wherein upon substantial completion of step (c), the 11. 2
 - fiber pitch binder has a soffening point of about 90°C to about 200°C, a MCC value
 - of about 50 to about 75%, and a viscosity of about 1 to about 50 poise at about
- 160°C.
 - A method of making a fiber, pitch binder comprising the steps of: 12.
 - providing a pitch having a viscosity of about 0.1 to about 5 poise; (a)
 - 3 providing an amount of carbon fibers; and (b)
 - 4 admixing said fibers and said pitch to homogeneously disperse said fibers (c)
 - 5 into a fiber pitch binder such that said fibers are dispersed into substantially
- 6 single mono-filaments which are randomly oriented within the fiber binder
- 7 pitch.
- The method of claim 11 wherein step (b) comprises providing carbon fibers 1 13.
- 2 in an amount of about 5 wt.% of said pitch.
- 14. The method of claim 11 wherein in step\(b) said fibers are added to said pitch 1
- . 5 without a substantial amount of a filler.

- 1 15. \A pitch based binder comprising an admixture of pitch having a viscosity of
- 2 about 01 to about 5 poise at a temperature of about 260 to about 140°C with 0.5 to
- 3 about 10,0 wt.% of carbon fibers based on a weight of said pitch, substantially
- 4 homogeneously dispersed within said pitch as substantially single mono-filaments
- 5 which are randomly oriented.

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- 1 16. The pitch based binder of claim 15 wherein said admixture has a softening
- 2 point of about 90\to about 200°C, a MCC value of about 50 to about 75% and a
- 3 viscosity of about 1 to about 50 poise at about 160°C.
 - 17. The pitch based binder of claim 15 wherein said admixture has substantially similar rheological behavior as said pitch.
 - 18. A method of forming a darbon body comprising the steps of:
 - (a) providing a binder comprising an admixture of pitch having a viscosity of about 0.1 to about 5 poise at a temperature of about 260 to about 140°C and about 0.5 to about 10.0 wt.% of carbon fibers based on a weight of said pitch, substantially homogeneously dispersed within said pitch as substantially single mono-filaments which are randomly oriented;
 - (b) providing a filler;
- 8 (c) mixing said binder having said carbon fibers substantially homogeneously
 9 dispersed as substantially single mono-filaments which are randomly oriented
 10 with said filler to produce a binder-filler mix;
- 11 (d) shaping said binder-filler mix to form a shaped body; and
- (e) carbonizing said shaped body to form a carbon body.
 - 1 19. The method of claim 18 wherein step\()(a) comprises providing a binder
- 2 having a softening point of about 90 to about 200°C, a MCC value of about 50 to
- 3 about 75%, and viscosity of about 1 to about 50 poise at about 160°C.

- 1 20. The method of claim 18 wherein in step (a) said pitch is derived from coal
- 2 tar.

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- 1 /21. The method of claim 18 wherein in step (a) said pitch is derived from
- 2 petroleum feedstock.

22. A carbon body having a substantially homogenous distribution of carbon fibers dispersed within said carbon body as substantially single mono-filaments which are randomly oriented, said carbon fibers present in an amount of about 1.5 to about 3.0 wt.% based on a weight of said carbon body.

- 23. A method of making a graphite body having a reduced coefficient of thermal expansion comprising the steps of:
 - (a) providing a binder comprising an admixture of pitch having a viscosity of about 0.1 to about 5 poise at a temperature of about 260 to about 140°C and about 0.5 to about 10.0 wt.% of carbon fibers based on a weight of said pitch, substantially homogeneously dispersed within said pitch as substantially single mono-filaments which are randomly oriented;
- (b) providing a filler;
- 9 (c) mixing said binder and said filler to produce a binder-filler mix having a substantially homogenous dispersion of carbon fibers which are randomly oriented throughout.
- 12 (d) extruding said binder-filler mix to form a carbon body;
- (e) carbonizing said carbon body and
- 14 (f) graphitizing said carbon body to form a graphite body.
- 1 24. The method of claim 23 wherein step (f) comprises graphitizing said carbon
- 2 body to form a graphite body having carbon fibers substantially homogeneously
- 3 dispersed throughout said graphite body as substantially single mono-filaments of a
- 4 random orientation.

- 1 25. The method of claim 23 wherein step (f) comprises graphitizing said carbon
- 2 body to form a graphite body having about 1.5 to about 3.0 wt.% carbon fibers
- -3 based on a weight of said graphite body, substantially homogeneously dispersed
- 4 throughout said graphite body as substantially single mono-filaments of a random orientation.

26. A graphite body having a substantially homogenous distribution of carbon fibers dispersed within said graphite body as substantially single mono-filaments of a random orientation, said carbon fibers present in an amount of about 1.5 wt.% to about 3.0 wt.% based on a weight of said graphite body.

27. A graphite body having a longitudinal coefficient of thermal expansion of about -0.5×10^{-6} /°C to about 0.10×10^{-6} /°C as measured from about 25 to about 200°C.

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28. A graphite body having a substantially homogenous distribution of carbon fibers dispersed within said graphite body as substantially single mono-filaments of a random orientation, said carbon fibers present in an amount of about 1.5 wt.% based on a weight of said graphite body.

- 1 29. A graphite body produced by a method of:
 - (a) providing a binder comprising an admixture of pitch having about 0.5 to about 10.0 wt.% of carbon fibers based on a weight of said pitch, substantially homogeneously dispersed within said pitch as substantially single mono-filaments of a random orientation;
 - (b) providing a filler;
- 7 (c) mixing said binder and said filter to produce a binder-filler mix having a substantially homogenous dispersion of carbon fibers which are randomly oriented throughout;
- 10 (d) extruding said binder-filler mix to form a carbon body;

(e) carbonizing said carbon body;

- (f) graphitizing said carbon body to produce said graphite body having about 1.5 to about 3.0 wt.% carbon fibers based on a weight of said graphite body, said fibers dispersed throughout said graphite body as substantially single mono-filaments of a random orientation.
- 30. A graphite body produced by a method of:
 - (a) mixing a binder comprising an admixture of pitch having a viscosity of about 0.1 to about 5 poise at a temperature of about 260 to about 140°C and about 0.5 to about 10.0 wt.% of carbon fibers based on a weight of said pitch, said fibers substantially homogeneously dispersed within said pitch as substantially single mono-filaments of a random orientation, with a coke filler to form a binder-filler mix;
 - (b) extruding said binder-filler mix to form a carbon body;
 - (c) carbonizing said carbon body;
 - (d) graphitizing said carbon body to produce said graphite body having about 1.5 to about 3.0 wt.% carbon fibers based on a weight of said graphite body, said fibers dispersed throughout said graphite body as substantially single mono-filaments of a random orientation.

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